

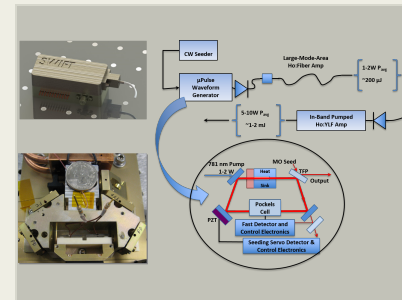
Compact 2-Micron Transmitter for Remote Sensing Applications, Phase I

Completed Technology Project (2016 - 2016)



Project Introduction

Beyond Photonics proposes to develop a highly compact, efficient next-generation single-frequency pulsed transmitter laser for current and future NASA missions focused on laser remote sensing in the short-wave infrared wavelength region near two microns. More reliable and compact sources of this type are required for NASA and commercial/military applications such as terrestrial and airborne Doppler winds, long-range measurement of molecular CO₂ and H₂O concentrations in the atmosphere, and identification and tracking of fast moving hard targets (e.g. space debris, asteroids, docking). We will emphasize the use of small but powerful lasers operating near 2 μ m and capitalize optimally on solid-state laser designs recently developed at Beyond Photonics as well as our team's extensive past experience with this specific laser technology. Efficient, compact hybrid approaches using bulk solid-state pulsed transmitters followed by doped-fiber amplification will be a focus to reach flexible performance on the order of 200 μ J/pulse, 0.5-8 kHz PRF, which can serve as an effective transmitter for many applications as-is in both coherent or direct detection lidar architectures, or which can be increased via further amplification as needed. Operationally flexible Q-switched and injection seeded operation compatible with several different applications with differing requirements will be emphasized. Very compact efficient MO laser technology will also be exploited and a prototype MO delivered in Phase I. Techniques will be explored to increase output pulse duration to narrow the transform-limited pulse spectra while maintaining very compact laser cavity length. These innovations will apply directly to current NASA missions and instruments (Doppler lidar, IPDA, LAS) and accelerate commercial development and availability of practical ground-based and airborne systems (e.g. compact airborne CO₂ concentration-measuring instruments) at BP and elsewhere.



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Table of Contents

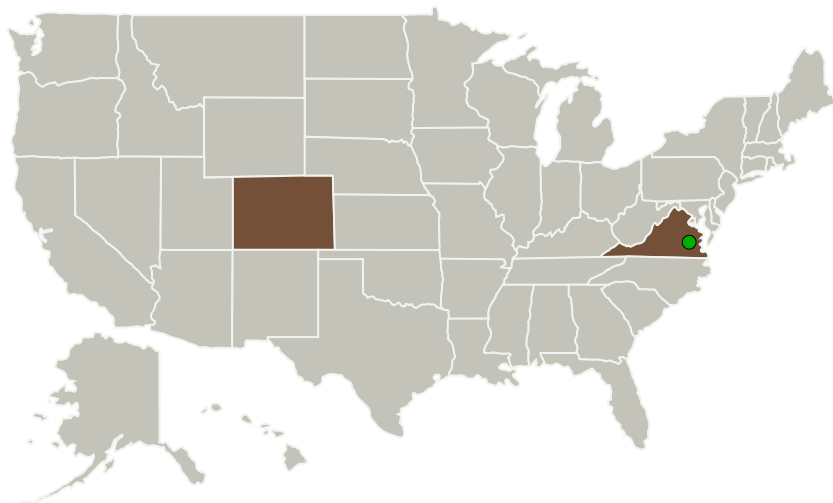
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Beyond Photonics LLC	Lead Organization	Industry	Lafayette, Colorado
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Colorado	Virginia
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Project Transitions

**June 2016:** Project Start**December 2016:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139887>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Beyond Photonics LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Sammy Henderson

Technology Maturity (TRL)

Start: **3**
 Current: **4**
 Estimated End: **4**

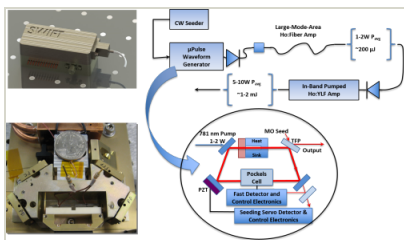


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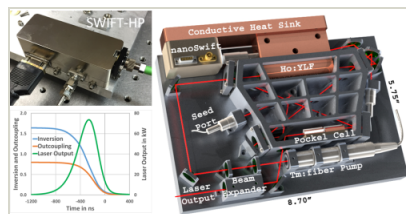


Images



Briefing Chart Image

Compact 2-Micron Transmitter for Remote Sensing Applications, Phase I
(<https://techport.nasa.gov/image/131825>)



Final Summary Chart Image

Compact 2-Micron Transmitter for Remote Sensing Applications, Phase I Project Image
(<https://techport.nasa.gov/image/136259>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System